

CLAIMS

What is claimed is:

- 1 1. A method, comprising:  
2 lithographically patterning a corner over a material;  
3 selectively removing portions of the material based on the lithographic pattern  
4 to obtain a region that defines the corner; and  
5 further removing portions of the material adjacent to the region to sharpen the  
6 corner.
- 1 2. The method of claim 1 wherein selectively removing portions of the material  
2 based on the lithographic pattern comprises using an anisotropic etching technique.
- 1 3. The method of claim 1 wherein lithographically patterning the corner includes  
2 applying a photoresist material.
- 1 4. The method of claim 3, further comprising removing the photoresist material  
2 from selected areas prior to sharpening the corner.
- 1 5. The method of claim 1 wherein further removing portions of the material  
2 adjacent to the region comprises using an isotropic etching technique to sharpen the  
3 corner.
- 1 6. The method of claim 1 wherein the material comprises a first material, the  
2 method further comprising:

3 placing a second material in the region; and  
4 removing excess second material from areas outside of the region.

1 7. The method of claim 6 wherein removing excess second material comprises  
2 using a chemical-mechanical polishing technique.

1 8. The method of claim 6, further comprising placing a third material over the  
2 second material.

1 9. The method of claim 8 wherein placing the third material over the second  
2 material and placing the second material in the region comprises using a deposition  
3 technique.

1 10. The method of claim 8 wherein the first and third materials comprise cladding  
2 material, and wherein the second material comprises core material.

1 11. The method of claim 1 wherein the corner comprises part of a Y-branch of an  
2 integrated optical device.

1 12. The method of claim 11 wherein the integrated optical device comprises a  
2 waveguide.

1 13. The method of claim 1 wherein the corner comprises part of one of a  
2 microelectromechanical structure (MEMS) device, a photonic crystal device, or a  
3 photonic bandgap device.

1 14. The method of claim 1, further comprising monitoring the removal of the  
2 portions of the material adjacent to the region if sufficient time has elapsed to  
3 sharpen the corner.

1 15. The method of claim 14 wherein monitoring the removal of the portions of the  
2 material adjacent to the region comprises:

3 forming a diffraction grating having pillars of a substantially same radius as  
4 the corner to be sharpened;

5 illuminating the pillars with a light and detecting light diffracted from the  
6 pillars;

7 removing the pillars concurrently with removing portions of the material  
8 adjacent to the region; and

9 determining if sufficient time has elapsed to sharpen the corner based on the  
10 detected light diffracted from the pillars as they are removed.

1 16. The method of claim 3 wherein the corner is sharpened while the photoresist  
2 is in place.

1 17. A method, comprising:

2 lithographically patterning a corner over a cladding material deposited on a  
3 substrate;

4 based on the lithographic pattern, vertically etching the cladding material to  
5 selectively remove portions of the cladding material to define a rounded corner; and

6 isotropically etching the cladding material at the rounded corner to sharpen  
7 the rounded corner.

1 18. The method of claim 17, further comprising depositing a core material in a  
2 trench, adjacent to the sharpened corner, which was formed by the vertical etching  
3 and by the isotropic etching.

1 19. The method of claim 18, further comprising depositing another cladding  
2 material over the core material, subsequent to a chemical-mechanical polish  
3 process to remove excess core material deposited outside of the trench.

1 20. The method of claim 17, further comprising:  
2 forming pillars concurrently with the vertical etching of the cladding material,  
3 the pillars having a dimension comparable to that of the rounded corner; and  
4 isotropically etching the pillars concurrently with the rounded corner to  
5 determine completion of the sharpening based on light diffracted from the pillars.

1 21. The method of claim 17 wherein lithographically patterning the corner  
2 includes using a photoresist.

1 22. A device, comprising:  
2 a corner made of a first material and formed over a substrate; and  
3 a region adjacent to the corner and made of a second material different from  
4 the first material, wherein the corner is made by an etch process to sharpen the  
5 corner.

1 23. The device of claim 22 wherein the first material comprises a cladding  
2 material, wherein the second material comprises a core material, and wherein the  
3 cladding and core materials comprise part of an optical waveguide.

1 24. The device of claim 22 wherein the corner and the region comprise part of a  
2 microelectromechanical structure (MEMS).

1 25. The device of claim 22 wherein the second material comprises air.

1 26. The device of claim 22, further comprising a third material formed over the  
2 corner and region.

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